

## Claims

1. Method for determining the current position (A, B, C, D ... ) of a head (9) of an occupant (8) in the passenger  
5 compartment (2) of a motor vehicle (1), said head (9) moving toward an automatic dynamic disabling zone (6) in front of an airbag module (5), using an image acquisition unit (16) with an ideal line of sight (17), which is essentially perpendicular to an ideal direction of movement (14) of the  
10 occupant (8), in which
- an image scenario in the passenger compartment (2) of the motor vehicle (1) including the occupant (8) is recorded at least cyclically using the image acquisition unit (16) and image information relating to the occupant (8) is detected;
  - 15 - both the position of the geometric center (10) of the head (9) and the apparent size (11) of the head (9) are determined in the direction of movement (14) in the respective current scenario image;
  - the respective current lines of sight (18) of the image  
20 acquisition unit (16) are defined as a vector, from a defined position (19) of the image acquisition unit (16) to the respective current position of the geometric center (10) of the head (9);
  - the respective current angles ( $\alpha$ ) between the ideal line of  
25 sight (17) and the current lines of sight (18) of the image acquisition unit (16) are calculated;
  - the respective current values for angles ( $\alpha$ ) and apparent size (11) of the head (9) are stored in a storage unit;
- and in which
- 30 - the value from the storage unit for which the absolute sum of the difference between angle ( $\alpha$ ) and  $0^\circ$  was minimal is

always assumed to be the size of the head (9).

2. Method for determining the current position (A, B, C, D ...)

5 compartment (2) of a motor vehicle (1), said head (9) moving toward an automatic dynamic disabling zone (6) in front of an airbag module (5), using an image acquisition unit (16) with an ideal line of sight (17), which is essentially perpendicular to an ideal direction of movement (14) of the  
10 occupant (8), in which

- an image scenario in the passenger compartment (2) of the motor vehicle (1) including the occupant (8) is recorded at least cyclically using the image acquisition unit (16) and image information relating to the occupant (8) is detected;  
15 - both the position of the geometric center (10) of the head (9) and the apparent size (11) of the head (9) are determined in the direction of movement (14) in the respective current scenario image;

- the respective current lines of sight (18) of the image  
20 acquisition unit (16) are defined as a vector, from a defined position (19) of the image acquisition unit (16) to the respective current position of the geometric center (10) of the head (9);

- the respective current angles ( $\beta$ ) between the ideal  
25 direction of movement (14) of the head (9) and the current lines of sight (18) of the image acquisition unit (16) are calculated;

- the respective current values for angles ( $\beta$ ) and apparent size (11) of the head (9) are stored in a storage unit;

30 and in which

- the value from the storage unit for which the absolute sum of the difference between angle ( $\beta$ ) and  $90^\circ$  was minimal is

always assumed to be the size of the head (9).

3. Method according to Claim 1 or 2,  
in which the image acquisition unit (16) is a 3D camera, which  
5 operates according to the stereoscopic method, according to  
the pencil of light method, according to the time of flight  
method or another equally appropriate method.

4. Method according to Claim 2 and 3,  
10 in which, instead of being based on the ideal direction of  
movement (14) of the head (9),  
- the respective current angles ( $\beta$ ) between current actual  
movement vectors (15) of the head (9) and the current lines of  
sight (18) of the image acquisition unit (16) are calculated.

15  
5. Method according to Claim 4,  
in which the respective last value for the position of the  
geometric center (10) of the head (9) is stored and the  
respective current movement vector (15) is calculated from the  
20 stored last and the current 3-dimensional positions of the  
head (9).

6. Method according to one of the preceding Claims,  
in which the defined position (19) of the image acquisition  
25 unit (16) is based on the center of a lens aperture of the  
image acquisition unit (16), in the case of a stereo camera  
for example the left lens.

7. Method according to one of the preceding Claims,  
30 in which the image acquisition unit (16) continuously records  
images of the relevant scenario, at least 25 images per  
second, in particular at least 30 images per second,

preferably at least 35 images per second.

8. Method according to one of the preceding Claims,  
in which the size of the storage unit is dimensioned such that  
5 at least all the measured values of a slow head movement from  
a first head position (A) to the relevant second head position  
(B) can be stored.

9. Method according to one of the preceding Claims,  
10 in which the storage unit is a ring buffer store, which is  
first filled and from then on the oldest value is always  
replaced by the current value.

10. Method according to one of the preceding Claims,  
15 in which the recordings of the head movement (14 or 15) are  
filtered by means of filters and/or movement models.

11. Method according to one of the preceding Claims,  
in which the size of the torso (13) or the size of another  
20 part of the body of the occupant (8) in the motor vehicle (1)  
is determined using the image acquisition unit (16) instead of  
the size (11) of the head (9).

12. Method according to one of the preceding Claims,  
25 in which different views of the occupant (8) are combined to  
form a 3D overall view of the person (8).

13. Method according to Claim 11,  
in which the front of the occupant (8), in particular said  
30 occupant's facial profile (12), is simulated from the overall  
view and its distance calculated from the switch zone (6) or

the airbag module (5).

14. Device for determining the current position (A, B, C, D ... ) of a head (9) of an occupant (8) in the passenger compartment (2) of a motor vehicle (1), said head (9) moving toward an automatic dynamic disabling zone (6) in front of an airbag module (5), characterized by appropriate means for carrying out the method according to one of the preceding Claims.